

Using “Pasco Capstone” Data Acquisition Software

1. Download and install the 60 day trial version at:
<http://www.pasco.com/family/pasco-capstone/index.cfm>
(it requires Windows XP SP2 or higher or Mac OS X v10.6 or higher)
2. Open the program, close the “Buy key/Enter key” window.
3. Choose a display. If you are using a webcam or prepared movie, drag the movie icon to the screen. If you are using a sensor, drag the graph icon.

For movie creation using a connected camera:

1. Click on record movie with synced data. You should see a preview from your camera. If there is no image, click on “hardware setup” and “add sensor/instrument”. If the image is static, click the red circle at the top of the image to preview that appears when you mouse over.
2. Set up your apparatus so that the range of motion of the object uses the whole screen. Include a known length (metre stick) in the image. You can enlarge the image if you want by dragging the corners.
3. You can adjust the frame rate at the bottom of the screen or under “Hardware Setup” if you want more options. The default should be fine.
4. Click on the red dot labeled “Record” and click again to stop when you are done.
5. If the movie looks good, click “File” and “Save as” using your name. If you don’t like it, click “Delete Last Run” at the bottom right.

Once you have a movie to analyze:

1. The top left button above the movie is a “t” on the bar that appears when you mouse over the movie. Click on that button to analyze the motion of the objects in the movie.
2. To set the scale, click on one end of the yellow calibration tool and drag it to one end of your metre stick or known length. Repeat with the other end. If the known length is not 1 metre, right click on “calibration tool” and select “properties”, then input the length.
3. Use the left mouse button to click on a point of the object in the movie. Think about how much uncertainty there is in your measurement of position.
4. Keep left clicking on the object until you have the data you want. If there is a second object, click on “create tracked object”.
5. See next page for analysis.

If you are using a sensor:

1. Drag a graph on the screen. Click on “select measurement” and choose the data you want to see, like “motion sensor – position(m)”. If you don’t see your sensor, check that the usb link light is on.
2. Choose sampling rate and zero. Click on “Record” to start and stop.
3. Click “File” and “save as” after each data set.
4. Repeat for multiple sets of data. Click on the rainbow triangle to select which run to display. Click the arrow beside “delete last run” to select data to delete. Watch that you don’t click “delete all”. If you do, click “file” and “load” without saving.

Analyzing completed data using Capstone:

1. Click on the button with a yellow pen and blue dots, “highlight range of points in active data”. Select the portion of the data set you want to use to determine the equation.
2. Over from that button is one with blue dots and the red line, “curve fits”. Click on the arrow beside it and select the curve corresponding to your data. Usually it will be “linear” or “quadratic” or “inverse”. You should get a best fit line and the line variables in a box.
3. Click on the red “A” to annotate the graph. Type in the equation for the data from the information given from step 1. For example: if your data is position-time and linear with slope 2.49 ± 0.54 and y-intercept -3.30 ± 0.82 write out the equation “ $d = 2.5 \text{ m/s } t - 3.3\text{m}$ ” – round to the precision of the uncertainty. IB students should include the uncertainty to 1 sig fig so it is “ $d = 2.5 \pm 0.5\text{m/s } t - 3.3 \pm 0.8\text{m}$ ”
4. Click “File” and “save” or hit the save button.
5. Click on the blue gear “properties” and “active data appearance” scroll down and click “show x error bars” and “show y error bars” then “set fixed range” and specify the amount depending on the uncertainty of your measuring method.
6. Click “File” and “print preview”. If you used a movie, have the screenshot of your movie with the points along with the graph or do each as a separate page.
7. If it looks good, print and/or print as pdf.